

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Docket No: Q87635

Toshihiko OKAMOTO, et al.

Appln. No.: 10/ 533,309      Group Art Unit: 1796

Filed : January 5, 2006      Examiner: Robert S. LOEWE

Title : CURABLE COMPOSITION AND METHODS FOR IMPROVING  
RECOVERY PROPERTIES AND CREEP PROPERTIES

DECLARATION UNDER RULE 132

Honorable Commissioner of Patents and Trademarks,  
Alexandria, Virginia 22313-1450

Sir:

I, Toshihiko Okamoto, a citizen of Japan and having postal mailing address of 1-chome 19-19, Nonoue, Akashi, Hyogo 673-0017, Japan, declare and say that:

In March 1994, I was graduated from Graduate School of Engineering, Osaka University, and received a master's degree in the field of chemistry;

Since April 1994, I have been employed by Kaneka Corporation and engaged in the work of research and development of modified silicone composition for sealing material in High Performance Polymers Division;

I am the inventor of the above-identified application and am familiar with the technical field of the present invention;

I respectfully submit herewith my exact report;

In order to demonstrate that the claimed inventions are patentable over the teachings by Wakabayashi et al., Doi et al., and Ando et al., I have carried out the

following experiments.

#### Object

The following experiments were performed to demonstrate excellent curability (as a skin formation time) of claimed curable compositions and recovery properties of cured articles obtained therefrom. The curable compositions mentioned below were prepared, according to the same manner as the Examples described in the instant specification, using various combinations of Si compounds (silicate, vinyltrialkoxysilane, etc.) and curing catalysts (a tin carboxylate salt having a quaternary  $\alpha$ -carbon atom, a tin carboxylate salt having a tertiary  $\alpha$ -carbon atom, an organotin, etc.)

#### Experiments

The curable compositions listed in the following table were prepared in the same manner as Examples 1-4 and Comparative Examples 1 and 2 illustrated in Table 1 of the instant specification.

Recovery ratio after 100% elongation at 60°C was determined in the same manner as explained in the Examples which are listed in Table 1 of the instant specification.

The skin formation time of each curable composition was evaluated in the following manner:

A composition was filled in an about 5-mm thick molding frame with a spatula, and thinly spread with the spatula in a planar shape. The time at which the spreading was completed was defined as the time of start of curing. The surface of the composition was then touched with a spatula, and the time at which the composition did not adhere to the spatula any longer was determined. The period from the start of curing to the time at which the composition did not adhere to the

spatula any longer was defined as the skin formation time. The skin formation time was measured in a condition of 23°C, 50%RH. The results are illustrated in the Table below.

The organic polymer (A-2) in the Table below corresponds to the organic polymer obtained in Synthetic Example 2, (A-3) corresponds to the organic polymer obtained in Synthetic Example 3, and (A-4) corresponds to the organic polymer obtained in Synthetic Example 4.

Table

Composition (Part(s) by weight)			Experiments								
			1	2	3	4	5	6	7	8	
Organic polymer	A-2 <Component (A1)>	Trimethoxy-silyl group	100	100	100	100		100			
	A-3 <Component (A1)>	Triethoxy-silyl group							100	100	
	A-4	Methyldi-methoxy-silyl group					100				
Filler		HAKUENKA CCR	120	120	120	120	120	120	120	120	
		Tiqaque R-820	20	20	20	20	20	20	20	20	
Plasticioizer		DIDP	55	55	55	55	55	55	55	55	
Thixotropy-imparting agent		Disparlon #6500	2	2	2	2	2	2	2	2	
Photostabilizer		Sanol LS770	1	1	1	1	1	1	1	1	
Ultraviolet Absorber		Tinuvin 327	1	1	1	1	1	1	1	1	
Antioxidant		Nocrac SP	1	1	1	1	1	1	1	1	
Adhesion-imparting agent		A-1120	3	3	3	3	3	3	3	3	
Si compound	Silicate <Component (B)>	Methyl Silicate 51	2	2			2	2			
		Ethyl Silicate 28			2				2		
		Trialkoxysilane	A-171				2				2
Curing catalyst	Tin carboxylate salt <a salt having a quaternary $\alpha$ -carbon atom>	Neostann U-50	3.4	3.4	3.4	3.4	3.4				
	Tin carboxylate salt <a salt having a tertiary $\alpha$ -carbon atom>	Neostann U-28						3			
	Carboxylic acid	Versatic 10		1.2	1.2	1.2	1.2				
	Amine	Laurylamine	0.75	0.75	0.75	0.75	0.75	0.75			
	Organotin	Neostann U-220							2	2	
Skin formation time			min.	50	40	50	60	50	140	40	25
Recovery Ratio			%	92	91	89	81	70	92	45	20

[Results]

The compositions of Experiment Nos. 1 to 3 were compositions which fall within the scope of the amended claim 1. All the compositions of Experiments Nos. 1 to 3 showed high recovery ratios, and short skin formation times (namely, each composition had excellent curability).

The composition of the Experiment No. 4 contained a Si compound other than silicates. Such a composition was inferior to the compositions of Experiment Nos. 1 to 3 in recovery ratio and curability.

The composition of the Experiment No. 5 contained an organic polymer having a methyldimethoxysilyl group. Such a composition showed remarkably poorer recovery ratio than the compositions of Experiment Nos. 1 to 3.

The composition of the Experiment No. 6 contained a tin carboxylate having a tertiary  $\alpha$ -carbon atom. Such a composition showed remarkably poorer curability than the compositions of Experiment Nos. 1 to 3.

The compositions of the Experiment Nos. 7 and 8 showed poor recovery ratio, although they showed excellent curability.

Here, in the case of compositions that contained an organic polymer having trialkoxysilyl group and an organotin, a silicate as the Si compound (Experiment No. 7) showed a tendency of lowering curability compared with the case of a Si compound other than silicates (Experiment No. 8).

On the contrary, in the case of compositions that contained an organic polymer having trialkoxysilyl group and a tin carboxylate having a quaternary  $\alpha$ -carbon atom, a silicate as the Si compound (Experiment Nos. 1 to 3) showed a tendency of increasing curability compared with the case of a Si compound other than silicates (Experiment No. 4).

From the results of these experiments, cured

products having excellent recovery performance and curability were produced only from compositions containing combinations of the organic polymer (A1) having trimethoxysilyl or triethoxysilyl group, a specific Si compound (silicate) (B), and a specific curing catalyst (tin carboxylate having a quaternary  $\alpha$ -carbon atom), which falls within the scope of the amended claim.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Signed this 14<sup>th</sup> day of April, 2010

Toshihiko Okamoto  
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